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REMARKS

Claim 1-14, 16-22 and 24-26 are pending in the present application. In the Final Office Action mailed September 28, 2005, the Examiner rejected claims 1-8, 19-22 and 24 under 35 U.S.C. §130(a) as being unpatentable over the Le Roux et al. article. The Examiner next rejected claims 1, 9-14, 16-19, 25 and 26 under 35 U.S.C. §103(a) as being unpatentable over Sandford et al. USP 5,451,876, in view of the Le Roux et al. article.

CLAIM OBJECTIONS

In addition to the rejections referenced above, the Examiner also objected to claims 1-10. In setting forth the objection, the Examiner indicated that "claims 1-10 are objected to because applicant has altered the scope of these claims, from what was originally presented for examination." OFFICE ACTION, September 28, 2005, p. 4. According to the Examiner, the amendment to claims 1-10 wherein "MR data" has been replaced with "k-space data" necessarily "mandates an entirely new search for currently applicable prior art by the examiner, because without the MR data qualifier with respect to the 'k-space' terminology any image acquisition technique with acquires frequency or temporal image data becomes applicable to the claims, and applicant's original specification does not support an arbitrary/temporal data arrays acquired from non-MRI technologies." Id. The Examiner's objection cannot be sustained on a number of grounds.

First, the Examiner has asserted that Applicant cannot broaden the scope of the claims during prosecution. That is not accurate. MPEP§2163.05 is directed to "Changes to the Scope of Claims". In the guidance set forth thereunder, the MPEP establishes that claims can be "changed after filing to either broaden or narrow the breadth of the claim limitations" provided that "each claim limitation [is] expressly, implicitly, or inherently supported in the originally filed disclosures." MPEP§2163.05.

Second, the phrase "k-space data" is properly supported in the originally filed disclosure. In fact, the term "k-space" appears in the original application a mere 32 times. Thus, it is incredulous for the Examiner to assert that the specification does not provide a sufficient foundation for the phrase "k-space data" in the amended claims. While not explicit, the Examiner has implicitly asserted that the claimed invention is limited to "MR data" and since, according to the Examiner, "k-space data" is not limited to data acquired

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with MR machines, claims 1-10 must minimally call for "MR k-space data". Application disagrees.

It is well-established that the specification must include a written description of the invention, provide the manner and process of making and using the invention (the so-called "enablement requirement"), and provide the best mode contemplated by the inventor of carrying out the invention. See MPEP §2161. Applicant satisfied each of those criteria. In doing so, Applicant identified the field of MR imaging as particularly applicable for the claimed invention. However, "a particular embodiment appearing in the written description may not be read into a claim where the claim language is broader than the embodiment." MPEP §2111.01 *citing Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875, 69 USPQ2d 1865, 1868 (Fed. Cir. 2004). As such, Applicant cannot be required to claim "MR k-space data" simply because of the preferred embodiment of the invention relates to MR imaging.

Third, until a final office action is entered in an application, Applicant has the right to unrestricted prosecution of the application whether in the form of additional consideration or searching by the Examiner. That is, 37 CFR §1.112 provides that "after reply by applicant or patent owner (§1.111 or §1.945) to a non-final action and any comments by an *inter partes* reexamination requester (§1.947), the application or the patent under reexamination will be reconsidered and again examined." 37 CFR §1.112. As the action mailed by the Office on June 10, 2005 was a "non-final" action, the Examiner cannot avoid consideration (and searching, if necessary) of the amendments to claims presented on June 27, 2005. In other words, Applicant may amend the application as Applicant sees fit and have those amendments considered and searched as a matter of right until a final action is entered in the application.

In sum, Applicant believes claims 1-10, as currently pending, comport with the statutory provisions of 35 U.S.C. §112. Moreover, if the Examiner has not considered and/or searched claims 1-10 as amended, Applicant requests that the Examiner do so as the Applicant is entitled to such consideration and searching as a matter of right as the amendments to claims 1-10 were not made in response to a final office action.

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CLAIM REJECTIONS

The Examiner then rejected claims 1-8, 19-22, and 24 under 35 U.S.C. §103(a) as being unpatentable over Le Roux et al. In setting forth the aforementioned rejection, the Examiner asserted that the reference teaches the step of "correcting the acquired k-space data for amplitude modulation effects." OFFICE ACTION, *supra*, p.6. In other words, the Examiner has asserted that the reference teaches or suggests the post-data acquisition step of correcting acquired data for amplitude modulation effects. However, the reference makes no such teaching. In fact, the reference teaches away from such a retrospective approach.

Specifically, in its Abstract, Le Roux et al. "describes an algorithm permitting the generation of sequences of nutation angles yielding series of echos with constant signal magnitudes." LE ROUX ET AL., *Stabilization of Echo Amplitudes in FSE Sequences*, MRM 30:183-191 (1993), p. 183. Le Roux et al. teaches that by varying "the nutation angle of each pulse in a controlled manner" the amplitude of the echoes can be kept "constant". LE ROUX ET AL., *supra*, p. 186. Based on the explicit teachings of Le Roux et al., one skilled in the art would readily recognize that the reference is directed to a pre-data collection technique. That is, the reference is clear that its authors provide a solution for the stabilization of echo amplitudes in FSE sequences by, not correcting the acquired k-space data, but rather, by varying the value of the nutation angle of each refocusing pulse of a pulse sequence used to acquire k-space data. One skilled in the art will recognize that the pulse sequence characterizes the manner by which spins are excited, encoded, and sampled. A pulse sequence is not used to correct for data that is already acquired. Thus, Le Roux, et al. neither teaches nor suggests a method or system for correcting acquired k-space data for amplitude modulation effects in an FSE acquisition. Therefore, claims 1-8, 19-22, and 24 call for subject matter patentably distinct from that taught and/or suggested by the Le Roux et al. Allowance thereof is requested.

The Examiner then rejected claims 1, 9-14, 16-19, 25, and 26 as being unpatentable over the combination of Sandford et al. and Le Roux et al. Just as Le Roux et al. alone fails to teach or suggest the claimed invention, the addition of Sandford et al. does not render the claimed invention unpatentable.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. MPEP §2142. Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the

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combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes each and every element of the claimed invention, but also provide "a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). That is, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art." MPEP §2143.01. "The fact that references can be combined or modified is not sufficient to establish *prima facie* obviousness." *Id.* When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). Applicant believes that a *prima facie* case of obviousness has not been established and one cannot be made based on the art of record because there is no motivation to combine the references and the art of record fails to teach each and every element of the claimed invention.

As established above, Le Roux et al. is not directed to a post-data acquisition process. Applicant agrees that Le Roux et al. does pertain to fast spin echo acquisitions, however, the reference must be considered as a whole when determining whether there is a motivation to combine multiple references. To support the combination of Le Roux et al. and Sandford et al., the references themselves must suggest the receiver gain technique of Sandford et al. being incorporated with the pulse sequence design technique of Le Roux et al., or vice-versa. There is simply no such motivation in the references.

Sandford et al. is directed to an MRI system with dynamic receiver gain whereby the gain of a receiver is dynamically changed during a scan to provide an optimal SNR figure without over-ranging the transceiver's A/D converter. In this regard, Sandford et al. teaches a system that picks up an NMR signal produced by a subject with a receiver coil and the NMR signal is amplified by an amount determined by a digital attenuation signal received from a backplane. See SANDFORD ET AL., col. 4, ll. 37-43. Sandford et al. teaches a

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signal modification technique that "chang[es] the digital attenuation signal applied to the receiver during the scan so that NMR signals of widely varying amplitude can be acquired at an improved SNR." SANDFORD ET AL., col. 5, ll. 3-7. In this regard, the reference teaches the normalization of acquired NMR signals so that the amplitude of an acquired signal is adjusted to account for its receive attenuation used during acquisition. See SANDFORD ET AL., col. 5, ll. 5-10. In other words, Sandford et al. discloses an imaging technique that amplifies an NMR signal for improved SNR and normalizes the amplified NMR signal to account for the amplification.

Le Roux et al. is directed to a pulse sequence design technique for generating pulse sequences of nutational angles that yield a series of echoes with constant signal magnitudes. As such, one reference (Sandford et al.) is concerned with improving SNR and the other reference (Le Roux et al.) is concerned with signal magnitude variations in early echoes when refocusing pulses are not exactly 180 degrees. See LE ROUX ET AL., *supra*, p. 183, Abstract. As such, there is simply no motivation to combine the teachings of the references.

Moreover, assuming the requisite motivation, there is no reasonable expectation of success that one skilled in the art would arrive at the claimed invention. Combining the pulse sequence design technique of Le Roux et al. with the SNR improvement technique of Sandford et al. results in a pulse sequence constructed to reduce the signal variations in early echoes of an echo train followed by the amplification of the sampled signal to improve SNR. As such, one skilled in the art would not arrive at the claimed invention of post-data collection processing of acquired k-space data to correct for amplitude modulation in a FSE acquisition.

Third, the references fail to teach or suggest each and every element of the claims. Le Roux et al. teaches a pre-data acquisition technique. The present invention is directed to post-data acquisition. Sandford et al. teaches an "MRI system in which receiver gain is dynamically adjusted during a scan to optimize the SNR for each received NMR signal." SANDFORD ET AL., col. 2, ll. 1-6. Sandford et al. then teaches that the NMR signals are adjusted to normalize out the differences in amplitude and phase caused by the varying gain settings; however, that normalization does not correct for amplitude modulation effects in an FSE sequence. The technique of Sandford et al. simply involves the normalization of signals that were arbitrarily amplified to improve SNR. In other words, the amplitude modulation effects present in an FSE acquisition using the technique of Sandford et al. will be amplified

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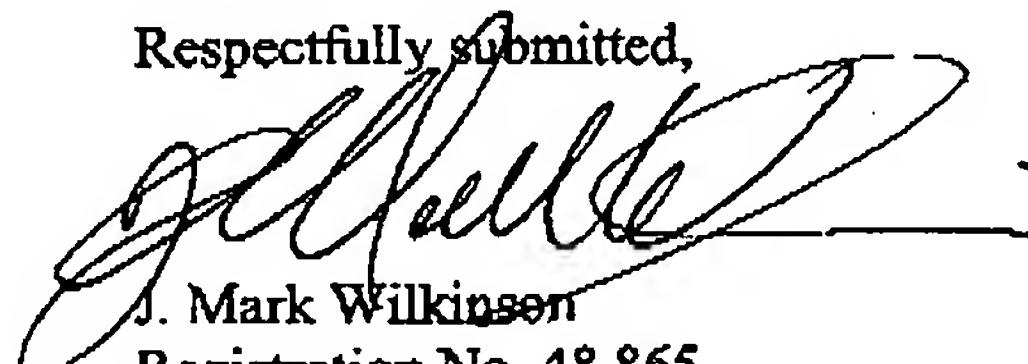
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and then later normalized to account for receiver gain settings during data acquisition. Sandford et al.'s technique will not correct for the amplitude modulation effects in the FSE acquisition itself. As such, not only is there no motivation to combine the references nor a reasonable expectation of arriving at the claimed invention based on the combination, the references themselves fail to teach or suggest each and every element of the claims. Therefore, claims 1, 9-14, 16-19, 25, and 26 are believed to be in condition for allowance.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-14, 16-22, and 24-26.

Applicant appreciates the Examiner's consideration of these Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,



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Dated: October 20, 2005
Attorney Docket No.: GEMS8081.191

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